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Supplementary Information for

Microbial chemolithotrophy mediates oxidative weathering of granitic bedrock

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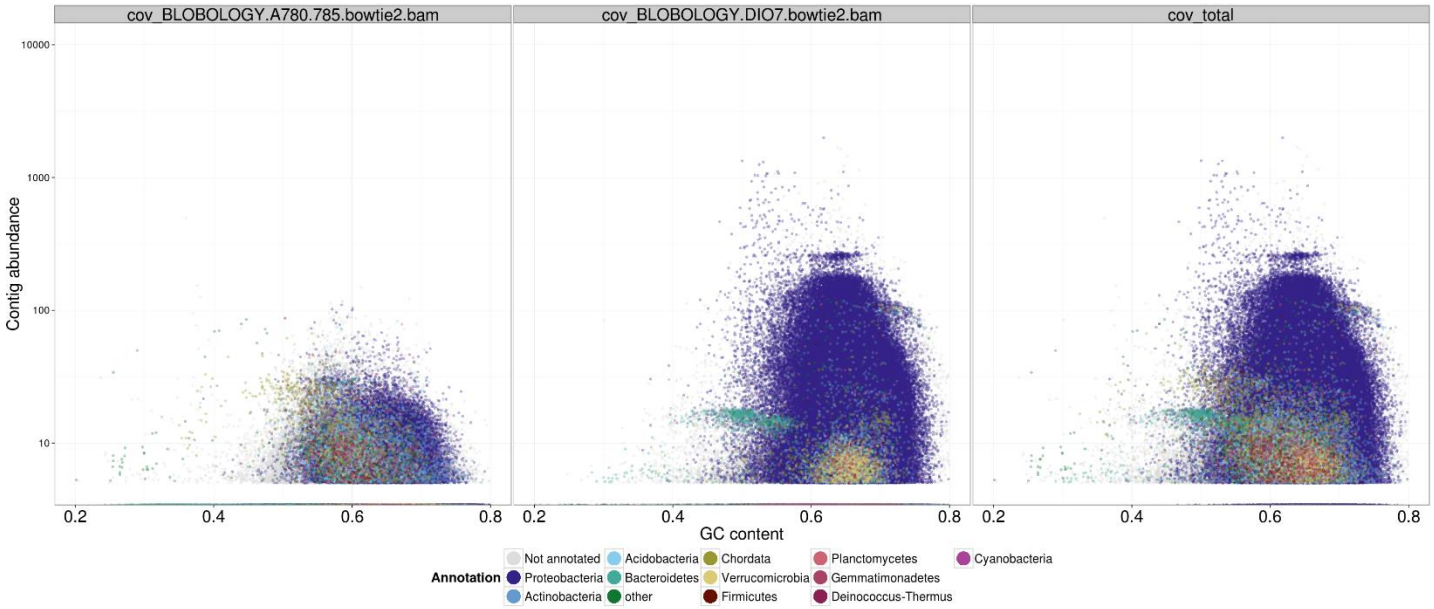

Fig. S1. GC versus contig abundance Blob plots of individual contigs (n= 584329) from the total coassembly (right) and the *in situ* metagenome (left) obtained from 7.85 m depth (Sample A) and a quartz diorite enrichment culture from the same inocula (center), colored by phylum level classification demonstrating a decrease in community complexity and enrichment in *Betaproteobacteria* in the enrichment culture.

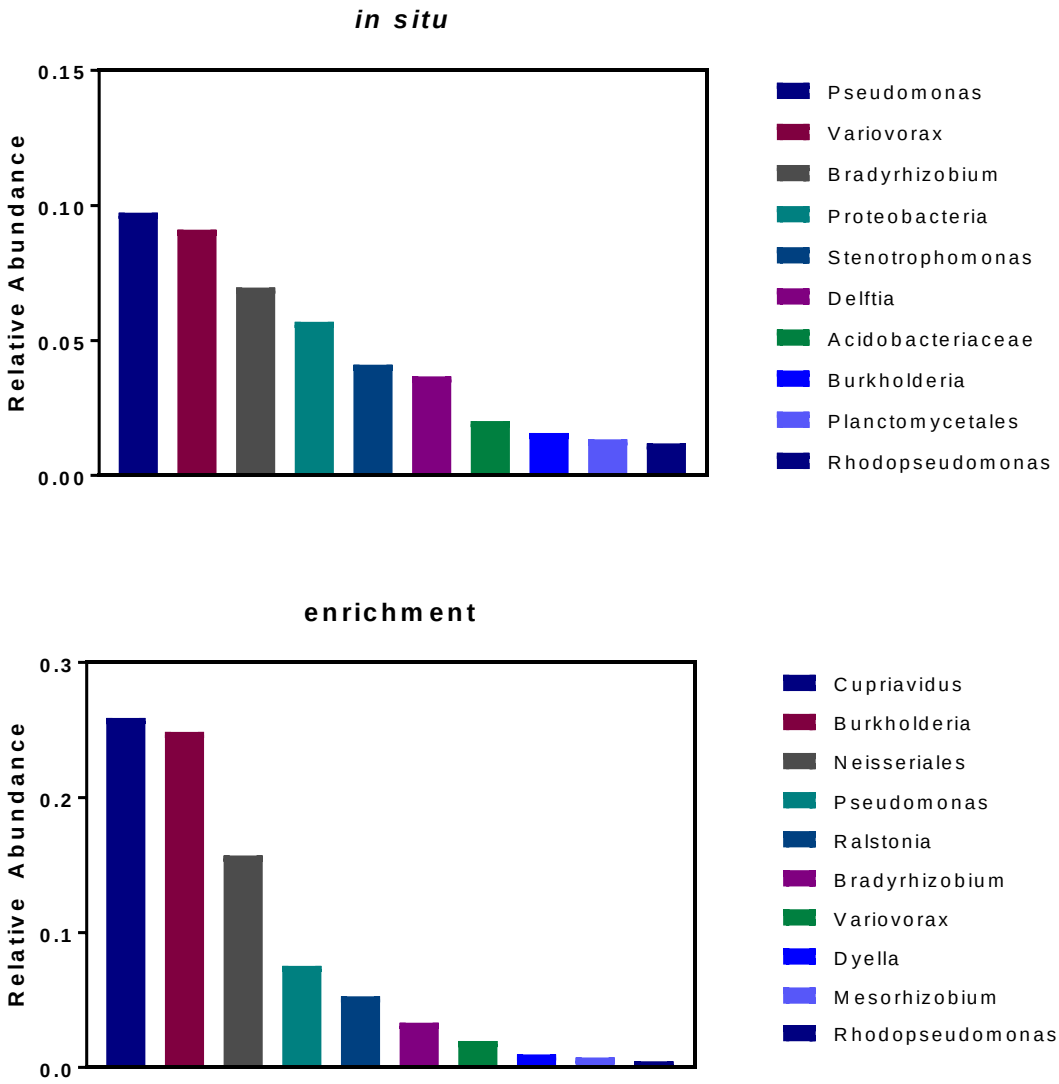

Fig. S2. Relative abundance of the 10 most abundant genera, or higher taxonomic classification if unable to achieve genera-level classification in the *in situ* (top) and enrichment culture (bottom) metagenomes based on taxonomic classification of individual reads.

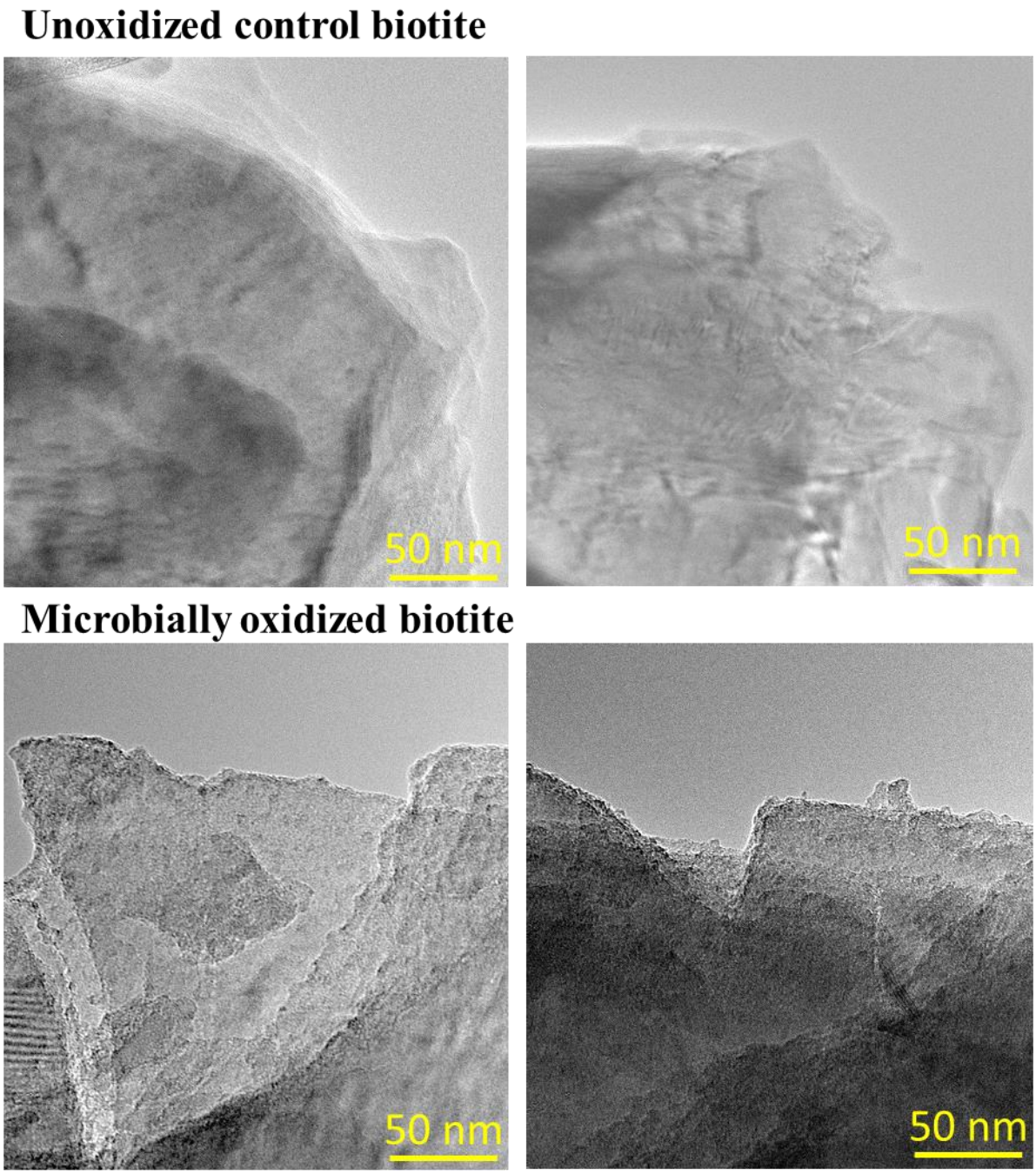

Fig. S3. Bright field TEM images comparing abiotic control (top) and microbially oxidized (bottom) biotite surfaces after 864 days incubation.

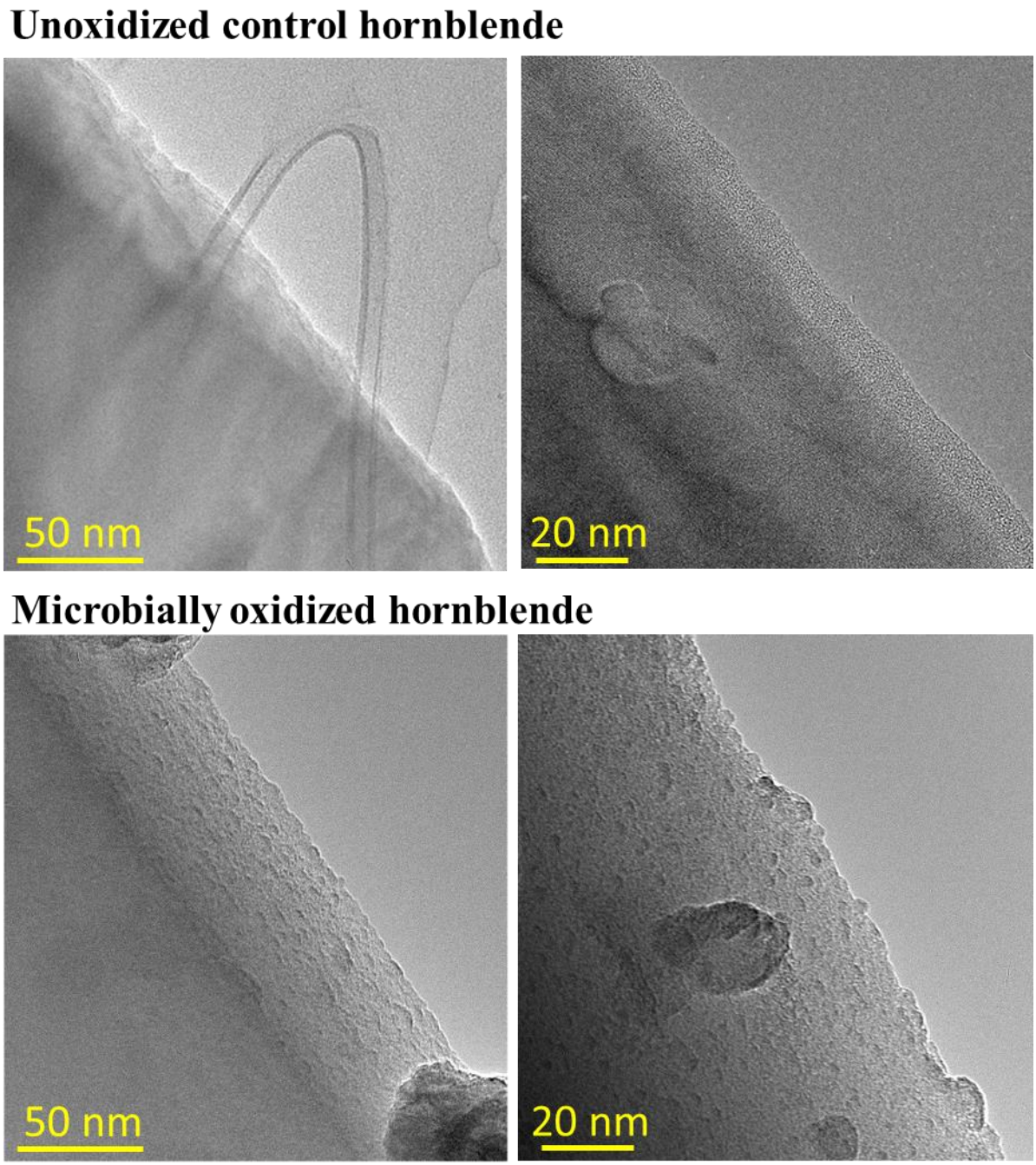

Fig. S4. Bright field TEM images comparing abiotic control (top) and microbially oxidized (bottom) hornblende surfaces after 864 days of incubation.

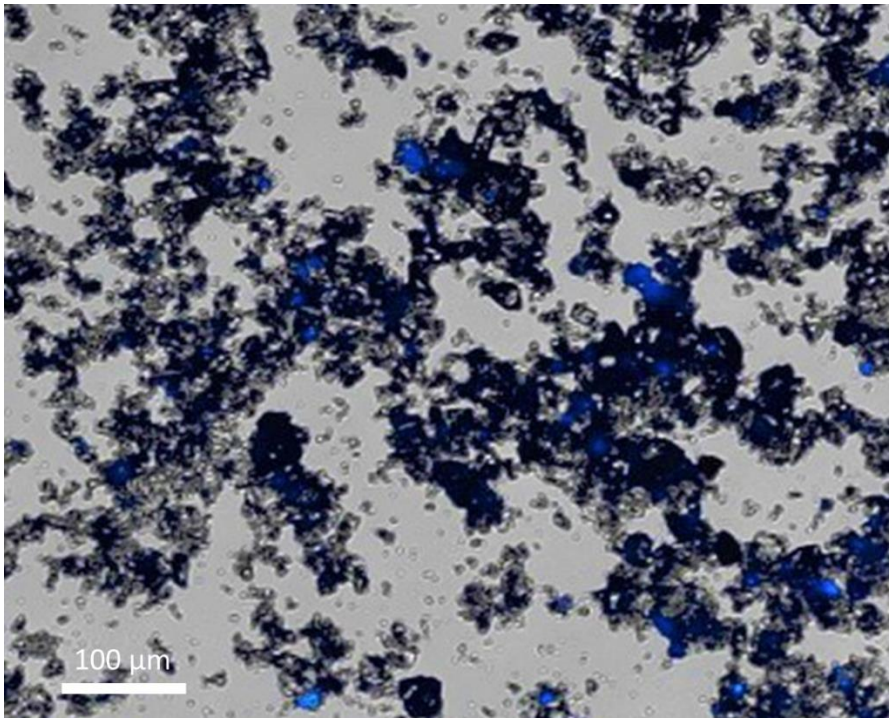

Fig. S5. Composite image (epifluorescence and light) of DAPI stained diorite oxidizing enrichment culture showing close association of cells (bright blue spots) with mineral grains.

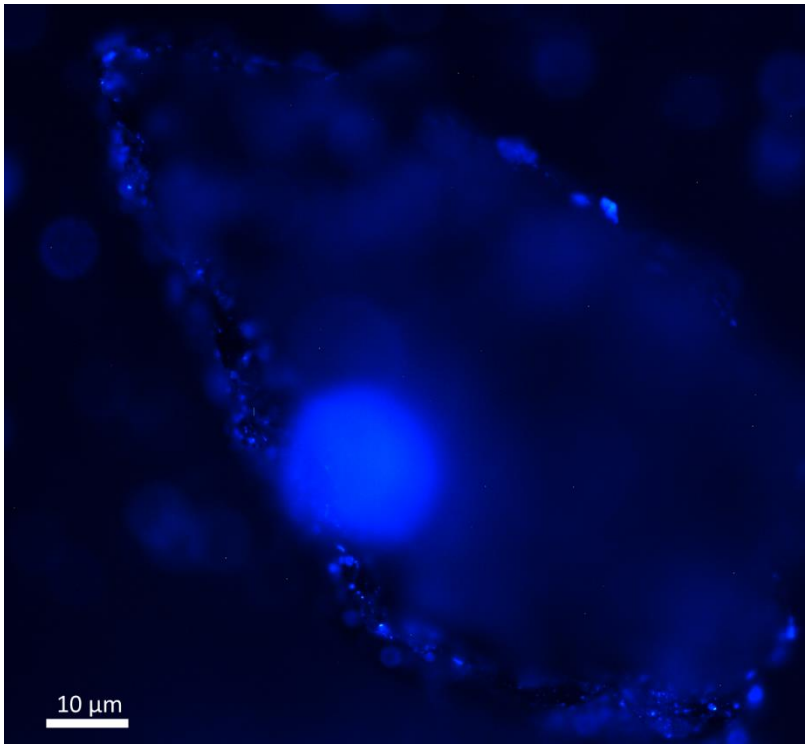

Fig. S6. Epifluorescence microscopy of a DAPI stained individual biotite grain obtained from enrichment culture revealing sparse microbial colonization of mineral edges.

Table S1 Calculated growth yields in µmol biomass C µmol^{-1} Fe(II) oxidized in individual reactors.

Sample	nM ATP	g C/L	µmol C/mL	Initial Fe(II) µmol/mL	Initial Fe(II)/Fe(tot)	Final Fe(II)/Fe(tot)	Δ Fe(II)/Fe(tot)	Fe(II) oxidized	yield
A1	1.646	0.00016	0.014	7.442	0.697	0.572	0.125	0.930	0.015
A2	1.751	0.00018	0.015	7.161	0.674	0.572	0.102	0.730	0.020
B1	3.142	0.00031	0.026	7.174	0.728	0.535	0.193	1.385	0.019
B2	2.045	0.00020	0.017	7.711	0.763	0.593	0.170	1.311	0.013
C1	3.033	0.00030	0.025	8.430	0.787	0.787	0.000	0.000	n/a
C2	3.007	0.00030	0.025	7.665	0.755	0.674	0.081	0.621	0.040

Table S2 Abundance of major elements in the Rio Blanco Quartz Diorite as determined by aqua regia digestion and ICP-OES analysis.

Element	Abundance (wt %)
Al	7.17
Ca	3.87
Fe	3.81
K	1.06
Mg	1.33
Na	2.04
Ti	0.304